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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,732	01/28/2004	David Champion	200300734-1	6089

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EXAMINER	
WALFORD, NATALIE K	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 11/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/767,732	CHAMPION ET AL.	
	Examiner	Art Unit	
	Natalie K. Walford	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-66* is/are pending in the application.

4a) Of the above claim(s) *2,11-25,37-39,41-43 and 51-66* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-10,26-36,40 and 44-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The Amendment, filed on August 22, 2006, has been entered and acknowledged by the Examiner. Claims 1-66 are pending in the instant application.

Election/Restrictions

The Examiner notes that a mistake was made in the original restriction, mailed on February 6, 2006. Instead of examining three different species, the Examiner meant to identify the three groups as combination-subcombination. The three inventions are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combinations as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination (previously Group A) as claimed does not require the particulars of the subcombination (previously Group B and C) as claimed because the photonic-crystal filament does not need the core filament for forming or the compressing the precursor material in a sheath. The subcombination has separate utility such as using the core filament and sheath in another filament, such as a tungsten filament

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 4-5, 31, 36, and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by Enokido et al. (US PUB 2004/0255841).

Regarding claim 1, Enokido discloses a method for forming a photonic-crystal filament, the method comprising the steps of:

a) mixing a slurry comprising particles of substantially uniform size and a precursor material for a desired metal (paragraphs 39-49 and FIG. 7, items 41a, 42a, and 43a);

b) urging the slurry through an orifice while forcing the particles and precursor material into a combination having a desired crystallographic (i.e. a three-dimensional periodic structure, paragraph 43) configuration (FIG. 7, item 46a and paragraphs 41-49);

c) drying the combination having a desired crystallographic configuration (paragraph 47) emerging from the orifice (paragraphs 41-50); and

d) sintering the precursor material, whereby a photonic-crystal filament is formed (paragraph 52).

Regarding claim 4, Enokido discloses the method of claim 1, further comprising the step of: f) heating the dried combination to remove the particles (paragraphs 41-49).

Regarding claim 5, Enokido discloses the method of claim 4, wherein the heating step f) and the sintering step d) are performed simultaneously (paragraph 52).

Regarding claim 31, Enokido discloses the method of claim 1 wherein the particles comprise substantially spherical particles (FIG. 8, item 61).

Regarding claim 36, Enokido discloses the method of claim 1, wherein the photonic-crystal filament has a desired photonic band-gap, and the substantially uniform size of the particles is adapted to provide the desired photonic band-gap (paragraph 71).

Regarding claim 40, Enokido discloses the method of claim 1, wherein the photonic-crystal filament has a longitudinal axis and a selected crystallographic axis of the desired crystallographic configuration is aligned parallel to the longitudinal axis of the photonic-crystal filament (FIG. 8, item 61).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3, 8, 29-30, 32, 44-48, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Enokido et al. (US PUB 2004/0255841).

Regarding claim 3, Enokido discloses the method of claim 1, but does not expressly disclose the further step of: e) compressing the slurry, as claimed by Applicant. Enokido does disclose that the slurry is stirred and then fed through the print heads (paragraph 96). Therefore, for the slurry to fit through the print heads, it would have to be compressed or reduced, as claimed by Applicant.

Regarding claim 8, Enokido discloses the method of claim 1, but does not expressly disclose the further step of: g) reducing the precursor material to metallic form, as claimed by

Applicant. Enokido does disclose that the slurry is of metallic form (paragraph 39); hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made that the precursor material would be of metallic form, since the slurry is as well.

Regarding claim 29, Enokido discloses the method of claim 1, but does not expressly disclose that the precursor material comprises an oxide of tungsten, as claimed by Applicant. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the precursor material comprise an oxide of tungsten, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the purpose of using it for the precursor material.

Regarding claim 30, Enokido discloses the method of claim 1, but does not expressly disclose that the precursor material comprises peroxopolytungstic acid, as claimed by Applicant. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the precursor material comprise peroxopolytungstic acid, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the purpose of using it for the precursor material.

Regarding claim 32, Enokido discloses the method of claim 1, but does not expressly disclose that the particles comprise non-spherical particles, as claimed by Applicant. It would have been obvious to one having ordinary skill in the art to change the shape of the particle to be non-spherical, since such a modification would have involved a mere change is the shape of the particle. A change in shape is generally recognized as being with the level of ordinary skill in the art.

Regarding claim 44, Enokido discloses a method of cladding a metal filament, the method comprising the steps of:

a) providing a metal filament (paragraph 39);

b) mixing a slurry comprising particles of substantially uniform size and a precursor material for a desired metal (paragraphs 40-49 and FIG. 7, items 41a, 42a, and 43a);

c) urging the metal filament and the slurry through an orifice while forcing the particles and precursor material into a combination having a desired crystal configuration surrounding the metal filament (FIG.7, item 46a and paragraphs 41-49);

d) drying the combination having the desired crystallographic configuration (paragraph 47) emerging from the orifice (paragraphs 41-50);

e) sintering the precursor material (paragraph 52), but does not expressly disclose compressing the precursor material within a sheath, while drawing the filament and sheath through a series of two or more successively smaller dies, whereby the filament is clad with a photonic crystal, as claimed by Applicant. Enokido does disclose that the slurry is stirred in a sheath (i.e. tank) and then fed through the print heads such that the filament and photonic crystal are mixed (paragraph 96). Therefore, for the slurry to fit through the print heads, it would have to be compressed or reduced, as claimed by Applicant.

Regarding claim 45, it has been held that to be entitled to weight in method claims, the recited structure limitations therein must affect the method in manipulative sense, and not to amount to the mere claiming of a particular structure, such as the clad filament.

Regarding claim 46, Enokido discloses the method of claim 45, but does not expressly disclose the further step of: g) compressing the slurry, as claimed by Applicant. Enokido does

disclose that the slurry is stirred and then fed through the print heads (paragraph 96). Therefore, for the slurry to fit through the print heads, it would have to be compressed or reduced as claimed by Applicant.

Regarding claim 47, Enokido discloses the method of claim 45, further comprising the step of: h) heating the dried combination to remove the particles (paragraphs 41-49).

Regarding claim 48, Enokido discloses the method of claim 48, wherein the heating step h) and the sintering step e) are performed simultaneously (paragraph 52).

Regarding claim 50, Enokido discloses the method of claim 45, but does not expressly disclose that the precursor material comprises a metal oxide, as claimed by Applicant. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the precursor material comprise a metal oxide, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the purpose of using it for the precursor material.

Claims 6-7, 26-28, 33-35, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Enokido et al. (US PUB 2004/0255841) in view of Fleming et al. (US 6,768,256).

Regarding claim 6, Enokido discloses the method of claim 1, but does not expressly disclose that the particles comprise an inert material, as claimed by Applicant. Fleming is cited to show a photonic crystal with particles comprising silicone, an inert material (column 5, lines 53-56). Fleming teaches that using certain photonic crystal structures and materials can help to modify spectral properties of a light source (column 2, lines 32-33).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Enokido's invention to include the particles comprising an inert material as suggested by Fleming for helping the spectral properties of a light source using the photonic crystal.

Regarding claim 7, Enokido discloses the method of claim 1, but does not expressly disclose that the precursor material comprises a metal oxide, as claimed by Applicant. Fleming is cited to show a photonic crystal using metal oxide (column 6, lines 12-24). Fleming teaches that the use of a metal oxide such as tungsten can provide large dielectric contrast and moderate imaginary dielectric contrast preferred for enhanced emission (column 6, lines 15-18).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Enokido's invention to include the precursor material comprising a metal oxide as suggested by Fleming for enhancing emission.

Regarding claim 26, Enokido discloses the method of claim 1, but does not expressly disclose that the desired metal is a refractory metal, as claimed by Applicant. Fleming is cited to show a photonic crystal using a refractory metal (column 6, lines 12-24). Fleming teaches that the use of a refractory metal such as tungsten can provide large dielectric contrast and moderate imaginary dielectric contrast preferred for enhanced emission (column 6, lines 15-18).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Enokido's invention to include the desired metal is a refractory metal as suggested by Fleming for enhancing emission.

Regarding claim 27, the combined reference of Enokido and Fleming disclose the method of claim 27, wherein the refractory metal is selected from the list consisting of tungsten, platinum, tantalum, molybdenum, and alloys thereof (column 6, lines 15-18).

Regarding claim 28, Enokido discloses the method of claim 1, but does not expressly disclose that the desired metal is tungsten or an alloy thereof, as claimed by Applicant. Fleming is cited to show a photonic crystal using tungsten (column 6, lines 12-24). Fleming teaches that the use of a metal such as tungsten can provide large dielectric contrast and moderate imaginary dielectric contrast preferred for enhanced emission (column 6, lines 15-18).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Enokido's invention to include the desired metal is tungsten or an alloy thereof as suggested by Fleming for enhancing emission.

Regarding claim 33, Enokido discloses the method of claim 1, but does not expressly disclose that the particles comprise polymer particles, as claimed by Applicant. Fleming is cited to show a photonic crystal with particles comprising silicone, a polymer (column 5, lines 53-56). Fleming teaches that using certain photonic crystal structures and materials can help to modify spectral properties of a light source (column 2, lines 32-33).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Enokido's invention to include the particles comprising polymer materials as suggested by Fleming for helping the spectral properties of a light source using the photonic crystal.

Regarding claim 34, Enokido discloses the method of claim 1 wherein the particles are nanospheres (FIG. 8, item 61), but does not expressly disclose that the particles are polymer

nanospheres, as claimed by Applicant. Fleming is cited to show a photonic crystal with particles comprising silicone, a polymer (column 5, lines 53-56). Fleming teaches that using certain photonic crystal structures and materials can help to modify spectral properties of a light source (column 2, lines 32-33).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Enokido's invention to include the particles comprising polymer materials as suggested by Fleming for helping the spectral properties of a light source using the photonic crystal.

Regarding claim 35, the combined reference of Enokido and Fleming disclose the method of claim 34, but do not expressly disclose that the polymer particles comprise a material selected from the list consisting of polystyrene, polyethylene, polymethylmethacrylate (PMMA), latex, and combinations thereof, as claimed by Applicant. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the precursor material comprise a material selected from the list consisting of polystyrene, polyethylene, polymethylmethacrylate (PMMA), latex, and combinations thereof, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the purpose of using it for the polymer particles.

Regarding claim 49, Enokido discloses the method of claim 45, but does not expressly disclose that the particles comprise an inert material, as claimed by Applicant. Fleming is cited to show a photonic crystal with particles comprising silicone, an inert material (column 5, lines 53-56). Fleming teaches that using certain photonic crystal structures and materials can help to modify spectral properties of a light source (column 2, lines 32-33).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Enokido's invention to include the particles comprising an inert material as suggested by Fleming for helping the spectral properties of a light source using the photonic crystal.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Enokido et al. (US PUB 2004/0255841) in view of Kodas et al. (US PUB 2003/0175411).

Regarding claim 9, Enokido discloses the method of claim 8, wherein step g) of reducing the precursor material comprises heating the precursor material (paragraphs 41-49), but does not expressly disclose that the heating is done in a reducing environment, as claimed by Applicant. Kodas is cited to show a precursor composition that is heated under a reducing environment (paragraph 495). Kodas teaches that during this process, certain reaction conditions help for the formation of the metal at a desired temperature (paragraph 133).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Enokido's invention to include the heating done in a reducing environment for helping the formation of the metal.

Regarding claim 10, the combined reference of Enokido and Kodas disclose the method of claim 9, wherein the reducing environment comprises a gas selected from the list consisting of hydrogen, forming gas, a carbide gas, acetylene, and mixtures thereof (paragraph 495).

Response to Arguments

Applicant's arguments filed August 22, 2006 have been fully considered but they are not persuasive. The Examiner respectfully disagrees with the Applicant's arguments. With regards to claims 1 and 44, the Examiner points to paragraph 47 of Enokido. Enokido discloses that "the shaped body" has been formed through repetition of previous steps. Enokido does disclose then, that the combination has a desired crystallographic configuration (i.e. shaped body).

With regards to claim 40, the Examiner points to figure 8 of Enokido. Enokido shows that the photonic crystal filament is in a spherical shape having a longitudinal axis and a selected crystallographic axis. Enokido also discloses that the photonic crystal filament is formed into a sphere.

With regards to claim 3, the Examiner points to figure 7 of Enokido. The slurry is stirred and then dispersed thru a jet print head. The slurry must be compressed at some point in the process or it would not be possible for the slurry to come from the stirrer into the jet print head.

With regards to claim 8, the Examiner points to paragraph 39 of Enokido. A metal dielectric powder is used and then combined with an organic solvent. Also, a dispersant may be added to the solvent as well. It is obvious to one with ordinary skill that one of those may have been of a metallic form, depending on the desired outcome.

With regards to claim 32, the Examiner notes that changing the shape for a desired outcome is obvious. A change in shape is generally recognized as being with the level of ordinary skill in the art.

With regards to claims 6, 33-35, and 49, the Examiner notes that Fleming discloses a silicon photonic crystal. The Examiner also notes that is it known in the art that silicon can be a polymer material or inert material.

With regards to claim 7 and 26-27, the Examiner points to column 6 of Fleming, which teaches that tungsten may be used since it can provide large dielectric contrast and moderate imaginary dielectric contrast preferred for enhanced emission. The Examiner also notes that it is known in the art that tungsten may be a refractory metal.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Natalie K. Walford whose telephone number is (571)-272-6012. The examiner can normally be reached on Monday-Friday, 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571)-272-2457. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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